

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,699,928 B2
DATED : March 2, 2004
INVENTOR(S) : Cobbley et al.

Page 1 of 3

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 3,

Line 24, please insert a -- . -- after "composition";

Line 24, please start a new paragraph after "adhesive composition." Starting the new paragraph with -- Another aspect of the present... --;

Column 4,

Lines 5-6, please delete "2oxy-ethyl" and insert -- 2-ethoxyethyl --;

Column 8,

Line 47, please delete "nonbasic" and insert -- non-basic --;

Column 15,

Line 62-64, please delete "about 5 kg of applied force. Heat is also applied at a temperature of about 200° C. or less. Typically, a bond forms in about 1 second or less." and insert,

—typically a rigid structure having a pattern therein and can be formed from a variety of conventional materials that do not chemically react with screen printing paste. The pattern included in the stencil 167 includes a plurality of apertures 177 separated by solid portions (not labeled) of the stencil, wherein the plurality of apertures correspond to the desired location for dispensing the instant setting adhesive composition on the die 144. A quantity of the instant setting adhesive composition 146' is dispensed on a solid portion of the stencil 167, although the exact amount of the instant setting adhesive composition is not critical. A flexible blade 175 is positioned near the quantity of the instant setting adhesive composition 146'. The flexible blade 175 moves in one direction, shown for example as arrow A so as to pull the quantity of the instant setting adhesive composition against the stencil. Thus, it is similar in operation to that of a squeegee. As the flexible blade 175 is drawn over the surface of the stencil 167, a portion of the instant setting adhesive composition 146' falls through the plurality of apertures 177 to form a layer of instant setting adhesive composition 146 in the discrete pattern corresponding to the plurality of apertures 177 in the stencil 167. Accordingly, because the instant setting adhesive composition can be

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,699,928 B2
DATED : March 2, 2004
INVENTOR(S) : Cobbley et al.

Page 2 of 3

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 15 (cont'd),

applied at room temperature and sets to form a discrete pattern, stenciling is an advantageous method of application because special heating equipment is not required to apply the instant setting adhesive composition.

Furthermore, an instant setting adhesive composition could be deposited and patterned using a resist pattern with a solvent. This is sometimes referred to as a resist etch back. In general, such a resist etch back would involve patterning the adhesive composition with a patterned resist layer and then removing the resist with a suitable solvent, leaving the patterned instant setting adhesive composition.

Following or during the adhesive deposition process, the adhesive composition 146 is patterned such that streets (or zones) 152 are formed between the individual dice 144, such as by the methods described above. This is particularly useful for singulating the dice 144, e.g. saw cutting the dice. Preferably, these zones 152 are substantially free of adhesive 146, as shown in Figures 6 and 7. These streets 152 are also variously known in the art as scribe lines, saw lines, or avenues. With the streets 152 free of adhesive, the efficiency of the saw cutting procedure is unaffected by the adhesive layer 146. It is to be understood, however, that the invention can be practiced with adhesive located in the streets 152.

With respect to LOC packaging processes as shown at least in part in Figures 8-10A, in addition to the streets 152 preferably being essentially free of adhesive, the adhesive layer 146 is patterned such that the bond pads 154 (Fig. 8) for the dice 144 are also free of adhesive. As shown in Figure 8, this may be accomplished by patterning a substantially adhesive free area 156 around the bond pads 154. This may also be accomplished by a finer patterning of the adhesive layer 146 such that rather than having wide adhesive free areas, only the bond pads 154 are clear of adhesive (not shown).

With each die 144 coated with an instant setting adhesive composition 146, as shown in Figs. 8 and 9, the lead fingers 158, 160 of a leadframe can be attached to the die 144 by the application of heat and pressure, as indicated by pressure arrow 180,

182, in Fig. 10A. Pressure may be applied by a suitable technique such as a movable arm pressing the assembly against a stationary platen. Under the effect of heat and pressure, the adhesive composition 146 is in effect sandwiched between the lead fingers 158, 160 and the die 144 to form an adhesive bond or layer therebetween. This firmly attaches the die 144 to the lead fingers 158, 160 for the subsequent encapsulation process.

As shown in Fig. 10B, the die 144 includes bond pads 154 on one surface (typically the face surface). A back surface 151 is attached to lead fingers 158 with an instant setting adhesive composition 146. As described with respect to Fig. 10A, the lead fingers 158, 160 of a leadframe can be attached to the back surface 151 of the die 144 by the application of heat and pressure, as indicated by pressure arrow 180, 182. Again, under the effect of heat and pressure, the adhesive composition 146 is sandwiched between the lead fingers 158, 160 and the back surface 151 of the die 144 to form an adhesive bond or layer therebetween. This firmly attaches the die 144 to the lead fingers 158, 160 for the subsequent encapsulation process.

In forming a bond between any of the substrates described above with the instant setting adhesive composition as described herein, the pressure that is applied is typically about 5 kg of applied force. Heat is also applied at a temperature of about 200°C or less. Typically, a bond forms in about 1 second or less.—;

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,699,928 B2
DATED : March 2, 2004
INVENTOR(S) : Cobbley et al.

Page 3 of 3

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 17,

Line 43, please delete "methalkyl" and insert -- methallyl --;

Line 67, please delete "crotyl" and insert -- cresyl --;

Column 18,

Lines 23-24, please delete "a methalkyl group, and a 2-methoxymethyl group;" and insert -- a methallyl group, a crotyl group, and a 2-methoxyethyl group; --.

Signed and Sealed this

Sixteenth Day of November, 2004



JON W. DUDAS
Director of the United States Patent and Trademark Office